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Generation of Sonic Power During Welding

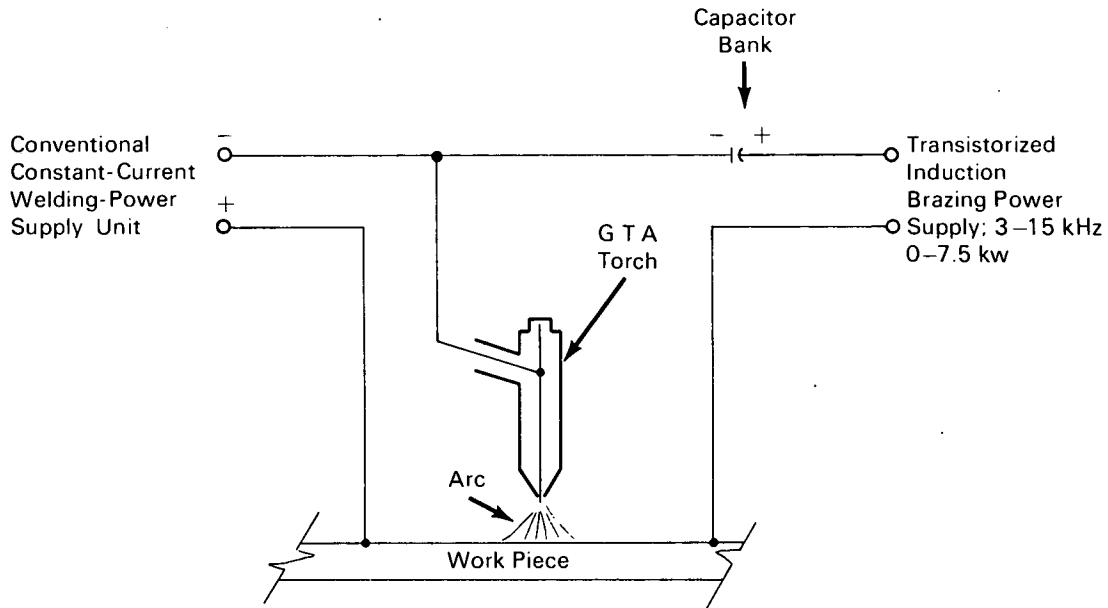


Fig. 1. Diagram of the Concept

The problem:

To develop a means to generate intense sonic power in the weld zone, close to the puddle, for reduction of porosity and refinement of the grain.

The solution:

A new conception (Figure 1), already shown to be an effective source of sonic and ultrasonic energy, may provide the solution.

How it's done:

The dc welding current and voltage (with corresponding length of arc) accord with conventional practice. The ac power supply is used to feed,

through the blocking capacitor bank, an alternating current that is superimposed on the dc so that the power supplied to the weld zone is the sum of the dc power and the root-mean-square ac power.

The ac induction brazing power supply, basically a constant-potential unit, is modified for simulation of a drooping characteristic by use of long cables for deliberate addition of resistance to that circuit. The ac unit consists of a free-running, variable-frequency oscillator, whose frequency is independent of the load constants, driving a power amplifier having a series-resonant output that is tunable for achievement of a unity power factor.

In a test with a frequency of about 4 kHz and a basic dc voltage of 12 v, 115 db was measured

(continued overleaf)

feet from the torch; close to the weld the level of sound was intolerable.

The effects of application of sonic power by this method have not yet been evaluated. In addition to the possible uses mentioned, the system may serve as a basic power supply for in-process ultrasonic testing, or generation of sonic and ultrasonic energy for tests such as destructive tests.

Notes:

1. The concept may be extensible to the molding of metals and plastics; it may interest mechanical designers, welders, and the metals-forming and plastics-forming industries.
2. This development is in conceptual stage only, and as of date of publication of this Tech Brief neither a model nor prototype has been constructed.

3. No further documentation is available. Inquiries may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B69-10404

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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